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Exhibit R-2, RDT&E Budget Item Justification: PB 2012 Air Force **DATE:** February 2011

APPROPRIATION/BUDGET ACTIVITY				R-1 ITEM NOMENCLATURE							
3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				PE 0603270F: <i>Electronic Combat Technology</i>							
COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
Total Program Element	31.456	16.992	22.268	-	22.268	23.325	23.958	23.605	23.992	Continuing	Continuing
632432: <i>Defensive System Fusion Technology</i>	4.455	4.707	6.190	-	6.190	6.252	6.039	5.824	5.920	Continuing	Continuing
63431G: <i>RF Warning & Countermeasures Tech</i>	20.000	4.142	5.412	-	5.412	6.741	7.069	6.907	7.020	Continuing	Continuing
63691X: <i>EO/IR Warning & Countermeasures Tech</i>	7.001	8.143	10.666	-	10.666	10.332	10.850	10.874	11.052	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program develops and demonstrates technologies to support Air Force electronic combat warfighting capabilities. The program focuses on developing components, subsystems, and technologies with potential aerospace combat, special operations, and airlift electronic combat applications in three project areas. The first project develops and demonstrates technologies for integrating electronic combat sensors and systems into a fused and seamless whole. The second project develops and demonstrates advanced technologies for radio-frequency electronic combat suites. The third project develops and demonstrates advanced warning and countermeasure technologies to defeat electro-optical, infrared, and laser threats to aerospace platforms. This program has been coordinated through the Reliance 21 process to harmonize efforts and eliminate duplication. This program is in Budget Activity 3, Advanced Technology Development, since it develops and demonstrates technologies for existing system upgrades and/or new sensor and electronic combat system developments that have military utility and address warfighter needs.

B. Program Change Summary (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Previous President's Budget	32.056	16.992	22.636	-	22.636
Current President's Budget	31.456	16.992	22.268	-	22.268
Total Adjustments	-0.600	-	-0.368	-	-0.368
• Congressional General Reductions		-			
• Congressional Directed Reductions		-			
• Congressional Rescissions	-	-			
• Congressional Adds		-			
• Congressional Directed Transfers		-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.600	-			
• Other Adjustments	-	-	-0.368	-	-0.368

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 63431G: *RF Warning & Countermeasures Tech*

FY 2010	FY 2011

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<u>Congressional Add Details (\$ in Millions, and Includes General Reductions)</u>		FY 2010	FY 2011
Congressional Add: <i>Advanced Electromagnetic Location of IEDs Defeat System.</i>		1.195	-
Congressional Add Subtotals for Project: 63431G		1.195	-
Congressional Add Totals for all Projects		1.195	-

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Exhibit R-2A, RDT&E Project Justification: PB 2012 Air Force								DATE: February 2011			
APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603270F: <i>Electronic Combat Technology</i>				PROJECT 632432: <i>Defensive System Fusion Technology</i>			
COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
632432: <i>Defensive System Fusion Technology</i>	4.455	4.707	6.190	-	6.190	6.252	6.039	5.824	5.920	Continuing	Continuing
A. Mission Description and Budget Item Justification This project develops and demonstrates technologies for integrating electronic combat sensors and electronic combat system fusion. It develops advanced algorithms and assessment techniques needed to evaluate and enable combat aircraft operations in multi-spectral threat and countermeasure environments. It also matures technologies required for command-and-control warfare, standoff jamming, and electronic support measures for the denial, disruption, and suppression of adversary air defense operations. Technologies include: advanced components and techniques needed to jam enemy radars; advanced standoff jammer technologies; and electronic collection methods to inform field commanders of changes in the electronic environment.											
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust. Description: Develop affordable radio-frequency and electro-optical emitter warning and electronic warfare (EW) battle management technologies, integrating EW and information operations. FY 2010 Accomplishments: Conducted research into electronic warfare battle management techniques and protocols in the Virtual Combat Environment for Electronic Conflict. Investigated and demonstrated electronic attack techniques from multiple nodes. Initiated a project to demonstrate a distributed (multi-node) electronic support/electronic attack architecture. Conducted research into integration of electronic attack and information operations to defeat an adversary integrated air defense system. FY 2011 Plans: Initiate a critical experiment to demonstrate synergistic electronic warfare (EW) and information operations (IO) techniques against a representative integrated air defense system. Initiate an effort to develop a virtual EW/IO battlespace environment for future project demonstrations, experiments, and assessments. Conduct a demonstration of electronic warfare battle management techniques and algorithms. Continue with the development of a distributed (multi-node) electronic support/electronic attack architecture. FY 2012 Base Plans: Increase maturity and perform demonstrations of electronic warfare battle management (EWBM) capabilities. Focus efforts on Distributed Electronic Attack concepts for specific threats and radar classes. Initiate effort in understanding and countering traditional and non-traditional targets in support of irregular warfare (IW).							4.455	4.707	6.190	-	6.190

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Continue an effort to develop a virtual EW/IO battlespace environment for future project demonstrations, experiments, and assessments.					
<i>FY 2012 OCO Plans:</i>					
Accomplishments/Planned Programs Subtotals	4.455	4.707	6.190	-	6.190

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: <i>Title Not Provided</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy N/A

E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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APPROPRIATION/BUDGET ACTIVITY 3600: <i>Research, Development, Test & Evaluation, Air Force</i> BA 3: <i>Advanced Technology Development (ATD)</i>				R-1 ITEM NOMENCLATURE PE 0603270F: <i>Electronic Combat Technology</i>				PROJECT 63431G: <i>RF Warning & Countermeasures Tech</i>			
COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
63431G: <i>RF Warning & Countermeasures Tech</i>	20.000	4.142	5.412	-	5.412	6.741	7.069	6.907	7.020	Continuing	Continuing
A. Mission Description and Budget Item Justification This project develops and demonstrates advanced technologies for radio-frequency electronic combat suites to enhance the survivability of aerospace vehicles and to provide crew situational awareness. One major area addresses technologies for missile/threat warning, radio-frequency receivers, electronic combat pre-processors, advanced sorting/pre-processing algorithms, and expert software for applications on existing and future electronic combat systems. Another major technology area focuses on the development and demonstration of subsystems and components for generating on-board/off-board radio-frequency countermeasure techniques. This includes the development of electronic countermeasures techniques as well as advanced electronic countermeasures technologies such as antennas, power amplifiers, and preamplifiers.											
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust. Description: Develop aerospace platform jamming technologies and techniques to counter advanced radio-frequency threats associated with current and future aerospace weapon systems. FY 2010 Accomplishments: Initiated advanced electronic attack jamming algorithms development for network operations to defeat future advanced threats. Conducted research on the synergy between electronic protection and electronic attack technologies to realize more effective jamming. Demonstrated a distributed, multi-node electronic support/electronic attack concept. Conducted research to tailor electronic attack techniques in combination with simultaneous information operations to counter the increasing adversary air defense systems moves to increased digital integration of defense sensors. Developed and assessed advanced technology, concepts, and algorithms to mitigate the effects of advanced signals on radio frequency receiver-processors. FY 2011 Plans: Initiate next-generation electronic attack techniques concept definition studies. Initiate a distributed tactical electronic combat receiver development effort. Demonstrate cognitive and adaptable electronic combat techniques and algorithms. Provide active electronic protection architecture concepts for transition. FY 2012 Base Plans: Demonstrate adaptable electronic attack (EA) technique concepts against a modeled threat environment. Initiate effort to develop a Network electronic support/electronic attack (ES/EA) Experiments Lab. Demonstrate a							18.805	4.142	5.412	-	5.412

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
cognitive jammer system concept in a laboratory environment. Define and analyze proactive electronic protection (EP) concepts. Continue effort to focus on next generation RF threats and potential EW concepts. <i>FY 2012 OCO Plans:</i>					
Accomplishments/Planned Programs Subtotals	18.805	4.142	5.412	-	5.412

	FY 2010	FY 2011
<i>Congressional Add:</i> Advanced Electromagnetic Location of IEDs Defeat System.	1.195	-
<i>FY 2010 Accomplishments:</i> Conducted Congressionally-directed effort.		
<i>FY 2011 Plans:</i>		
Congressional Adds Subtotals	1.195	-

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
• Activity Not Provided: <i>Title Not Provided</i>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

D. Acquisition Strategy N/A

E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.

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COST (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total	FY 2013	FY 2014	FY 2015	FY 2016	Cost To Complete	Total Cost
63691X: <i>EO/IR Warning & Countermeasures Tech</i>	7.001	8.143	10.666	-	10.666	10.332	10.850	10.874	11.052	Continuing	Continuing
A. Mission Description and Budget Item Justification This project develops and demonstrates the advanced warning and countermeasure technologies required to negate electro-optical, infrared, and laser threats to aerospace platforms. Off-board (decoys and expendables) and on-board countermeasure technologies developed for aircraft self-protection will provide robust, affordable solutions for protection against infrared missiles with autonomous seekers, multi-spectral threats, laser-guided weapons, and electro-optical and infrared tracking systems used to direct electro-optical, infrared, and radar-guided missiles.											
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Title: Major Thrust 1.							3.246	2.374	3.137	-	3.137
Description: Analyze the vulnerabilities of current infrared missile systems and future imaging infrared sensors.											
FY 2010 Accomplishments: Performed laboratory analyses and assessments on infrared guided missiles and future imaging systems. Investigated countermeasures techniques that include laser jamming and jamming with expendables combinations. Conducted digital, injection, hardware-in-loop simulation to develop and assess countermeasures (CM) effectiveness. Obtained imaging threat to enable evaluation of postulated CM concepts. Supported major advanced technology demonstrations through developmental test and evaluation.											
FY 2011 Plans: Continue laboratory development and testing of infrared countermeasures against current and advanced (i.e. imaging) missiles. Evaluate impact of confronting current and next generation threats on countermeasure design. Continue effort to obtain imaging threats. Continue support of major advanced technology demonstrations.											
FY 2012 Base Plans: Continue laboratory development and testing of infrared countermeasures against current infrared missile systems and future advanced threat sensors. Continue development of surrogate imaging sensors, processors and track algorithms to test and evaluate countermeasure concepts against advanced threat systems. Continue											

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
to develop countermeasure requirements for Combat Mission Infrared Countermeasures Advanced Technology Demonstration.					
FY 2012 OCO Plans:					
Title: Major Thrust 2. Description: Develop aerospace laser warning sensor technologies for timely alert to advanced laser acquisition/tracking sensors, including detecting and locating both high and low power signals. FY 2010 Accomplishments: Developed laser warning sensors to address emerging laser threats. Demonstrated integration of miniaturized laser warning sensors in sensor protection, personnel protection and countermeasures cueing. Developed laser detection/warning/geolocation concepts for air based defense against medium and high energy lasers. Investigated advanced concepts for laser beam rider (laser augmented manpad) detection and geolocation. Demonstrated hardware-in-the-loop laser threat/sensor engagement testing for mission survivability testing. FY 2011 Plans: Demonstrate advanced concepts for full spectrum laser threat detection/geolocation for countermeasure hand-off capable of supporting Combat Laser Infrared Countermeasure Survivability System program goals. Demonstrate advanced concepts supporting airbase defense against medium and high energy lasers. FY 2012 Base Plans: Continue to develop new laser warning concepts to address emerging directed energy threats. Continue to develop requirements for Combat Mission Infrared Countermeasures Advanced Technology Demonstration. Continue developing tactical aerospace laser optical simulation for laser sensor characterization and countermeasure concepts. FY 2012 OCO Plans:	0.562	2.299	3.201	-	3.201
Title: Major Thrust 3. Description: Develop a countermeasure technology to defeat passive electro-optical and infrared aircraft tracking sensors and ordnance guidance. FY 2010 Accomplishments:	0.677	1.205	1.609	-	1.609

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Investigated countermeasures (CM) concepts and techniques that include laser jamming and combined countermeasures to defeat the advanced threat class. Conducted digital, signal injection and hardware in the loop testing to develop and assess countermeasure effectiveness. Supported the development of major advanced technology demonstration for transition of directed infrared countermeasures (DIRCM) technology to combat aircraft. FY 2011 Plans: Continue to develop, test and refine infrared countermeasures against current and advanced threats including imaging threats. Evaluate the impact on countermeasures design and simulation and investigative processes for new imaging and digital seeker and sensor threats. Initiate the development process for major advanced technology demonstration (Combat Missions IRCM) to transition laser jammer concept to protect combat aircraft against advanced threat class. FY 2012 Base Plans: Combat Missions IRCM Advanced Technology Demonstration (ATD) for development of laser jammer on Combat Aircraft moves into hardware development phase. Continue to test and refine infrared countermeasures techniques for integration into the ATD system for demonstration testing. Development of concepts for protection of postulated future threats to generation 6 aircraft including component and subsystem functional requirements and technologies. FY 2012 OCO Plans:						
Title: Major Thrust 4. Description: Develop electro-optical sensor component technology to advance multiple space mission areas. Develop new sensor components, topologies, and architectures for space. FY 2010 Accomplishments: Conducted space situational awareness (SSA) sensor prototype experiments. FY 2011 Plans: Continue SSA sensor prototype experiments. FY 2012 Base Plans: Continue SSA sensor prototype experiment phase II. FY 2012 OCO Plans:		2.516	2.265	2.719	-	2.719

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B. Accomplishments/Planned Programs (\$ in Millions)							FY 2010	FY 2011	FY 2012 Base	FY 2012 OCO	FY 2012 Total
Accomplishments/Planned Programs Subtotals							7.001	8.143	10.666	-	10.666
C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2010</u>	<u>FY 2011</u>	<u>FY 2012 Base</u>	<u>FY 2012 OCO</u>	<u>FY 2012 Total</u>	<u>FY 2013</u>	<u>FY 2014</u>	<u>FY 2015</u>	<u>FY 2016</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• Activity Not Provided: Title Not Provided	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
D. Acquisition Strategy N/A											
E. Performance Metrics Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission.											